

CITY OF HAYWARD

AGENDA REPORT

AGENDA DATE 02/02/99

AGENDA ITEM _____

WORK SESSION ITEM WS #2

TO: Mayor and City Council

FROM: Director of Public Works

SUBJECT: Local Stop Sign Warrants for "T" Intersections

RECOMMENDATION:

It is recommended that the City Council review and comment on this report.

BACKGROUND:

This report is submitted in response to a request at the October 27, 1998, City Council work session concerning whether a "T" intersection should have a stop sign criteria that may differ from a four-way intersection.

Staff has completed research of applicable standards for installation of stop signs at "T" intersections. This research includes review of state and federal guidelines, local practice, and inquiries of nearby communities. The following summarizes the results.

State and Federal Guidelines:

The California State Traffic Manual establishes warrants for installation of stop signs for minor approaches (two-way stop) and multi-way stop signs (four-way stop). They are consistent with the stop sign warrants established in the Manual on Uniform Traffic Control Devices by the Federal Highway Administration. A three-way stop sign for a "T" intersection follows the same warrants for multi-way stop signs. There are no exclusive three-way stop sign warrants for "T" intersections.

However, the California Vehicle Code was amended in 1988 to clarify which vehicle has the right of way at a "T" intersection.

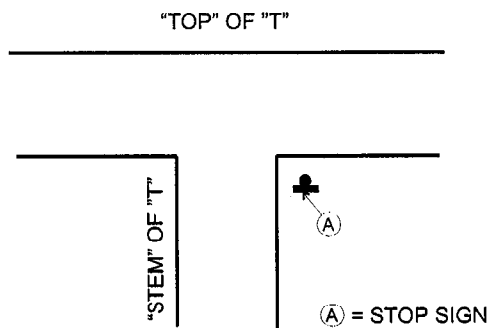


DIAGRAM OF "T" INTERSECTION

The Code amendment gave the unimpeded right of way to vehicles traveling along the top of the "T." Consequently, while a stop sign is not required to be placed at location A, as shown on the diagram, a stop or yield sign may be placed at that location when it is determined that added emphasis is required as an enforcement tool.

As previously mentioned, there are no exclusive three-way stop sign warrants for "T" intersections. For example, the installation of a four-way stop may require a minimum hourly volume for a total of 200 vehicles from the two minor approaches (see Exhibit A). The installation of a three-way stop would require the same 200 vehicles from one minor approach, or the "stem" of the "T" in the case of a "T" intersection.

State and federal guidelines also support the installation of multi-way stop signs when relatively balanced traffic flows indicate the need to allocate right of way between conflicting routes of traffic. These warrants call for a balance representing, at most, a 40-60 split in conflicting volumes (hence 200 vehicles per hour on the minor street approaches and 300 vehicles per hour entering the major street approaches). Hence, approximately the same volume of minor street traffic is required on the stem of a three-way "T" intersection, as on both legs of the top of the "T" to require stop sign interruption at the "top" of the "T."

Local Practice:

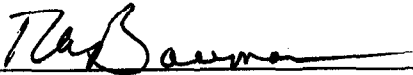
Staff has surveyed six local agencies in the Bay Area, including Alameda County and the cities of San Leandro, Berkeley, Fremont, Walnut Creek, and Concord. All of these jurisdictions use multi-way stop sign warrants that also apply to "T" intersections (three-way stops). None of these agencies have an exclusive three-way stop or "T" intersection warrants.

In 1994, the City of Hayward City Council adopted simpler "Local All-Way Stop Sign Warrants for Residential Streets" (see Council Report attached as Exhibit B). While applying the same principles of state and federal guidelines, the thresholds for meeting the warrant criteria are more lenient than that of state and federal guidelines. For example, the minor street is considered to balance the need for right of way with just 33 percent of the intersection volume, as opposed to the 40 percent required in state and federal guidelines.

Conclusion:

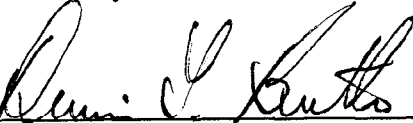
Staff has been unable to find any analysis of special warrants for three-way (or "T" intersection all-way) stops that are different from four-way stops. The state of the art appears to support the use of all-way or multi-way stop warrants for such situations. Staff recommends that the City adopted "Local All-Way Stop Sign Warrants for Residential Streets" be the criteria applied to streets at the top of "T" intersections. However, consistent with the state law, staff will install a stop sign or yield sign on the stem of a "T" intersection, when requested, since no warrants are required to be met for these installations.

Prepared by:



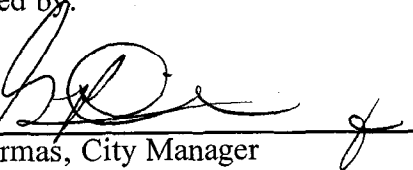
Robert A. Bauman, Deputy Director of Public Works

Recommended by:



Dennis L. Butler, Director of Public Works

Approved by:



Jesús Armas, City Manager

Attachments: Exhibit A: State Traffic Manual, Pages 4-38 and 4-39

Exhibit B: Agenda Report - Local All-Way Stop Sign Warrants for Residential
Streets

POLICY

A STOP sign is not a "cure-all" and is not a substitute for other traffic control devices. Many times the need for a STOP sign can be eliminated if the sight distance is increased by removing the obstructions.

STOP signs shall not be erected at any entrance to an intersection when such entrance is controlled by an official traffic control signal, nor at any railroad grade crossing which is controlled by automatic signals, gates, or other train-actuated control devices except as provided in CVC 21355, Stop Signs. The conflicting commands of two types of control devices are confusing. If traffic is required to stop when the operation of the stop-and-go signals is not warranted, the signals should be put on flashing operation with the red flashing light facing the traffic that must stop.

Where two main highways intersect, the STOP sign or signs should normally be posted on the minor street to stop the lesser flow of traffic. Traffic engineering studies, however, may justify a decision to install a STOP sign or signs on the major street, as at a three-way intersection where safety considerations may justify stopping the greater flow of traffic to permit a left-turning movement.

STOP signs should not be installed indiscriminately at all unprotected railroad crossings. The allowance of STOP signs at all such crossings would eventually breed contempt for both law enforcement, and obedience to the sign's command to stop. STOP signs may only be used at selected rail/highway grade crossings after their need has been determined by a traffic engineering study. Such study should consider approach speeds, sight distance restrictions, volumes, accident records, etc. This application of STOP signs should be an interim use period during which plans for lights, gates or other means of control are being prepared.

Portable or part-time STOP signs shall not be used except for emergency purposes. Also, STOP signs should not be used for speed control.

● Multiway STOP signs

The "Multiway Stop" installation may be useful at some locations. It should ordinarily be used only where the volume of traffic on the intersecting roads is approximately equal. A traffic control signal is more satisfactory for an intersection with a heavy volume of traffic.

POLICY

Any of the following conditions may warrant a multiway STOP sign installation:

1. Where traffic signals are warranted and urgently needed, the multiway stop may be an interim measure that can be installed quickly to control traffic while arrangements are being made for the signal installations.
2. An accident problem, as indicated by five or more reported accidents within a 12 month period of a type susceptible to correction by a multiway stop installation. Such accidents include right- and left-turn collisions as well as right-angle collisions.
3. Minimum traffic volumes
 - (a) The total vehicular volume entering the intersection from all approaches must average at least 500 vehicles per hour for any 8 hours of an average day, and
 - (b) The combined vehicular and pedestrian volume from the minor street or highway must average at least 200 units per hour for the same 8 hours, with an average delay to minor street vehicular traffic of at least 30 seconds per vehicle during the maximum hour, but
 - (c) When the 85-percentile approach speed of the major street traffic exceeds 40 miles per hour, the minimum vehicular volume warrant is 70 percent of the above requirements.

● Yield Signs

The YIELD sign (R1-2) assigns right of way to traffic on certain approaches to an intersection. Vehicles controlled by a YIELD sign need stop only when necessary to avoid interference with other traffic that is given the right of way.

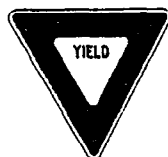
The YIELD sign shall be a downward pointing, equilateral triangle having a red border band and a white interior and the word YIELD in red inside the border band. The standard size shall be 36 x 36 x 36 inches.

● Warrants for YIELD Signs

The YIELD sign may be warranted:

1. On a minor road at the entrance to an intersection where it is necessary to assign right of way to the major road, but where a stop is not necessary at all times, and where the safe approach speed on the minor road exceeds 10 miles per hour.
2. On the entrance ramp to an expressway where an acceleration lane is not provided.

R1-2



Standard 36"



CITY OF HAYWARD AGENDA REPORT

AGENDA DATE 10/18/94

AGENDA ITEM 6

WORKSESSION ITEM _____

To: Mayor and City Council

From: Acting Director of Public Works

Subject: ESTABLISHMENT OF LOCAL RESIDENTIAL STOP SIGN WARRANT

Recommendation:

It is recommended that the City Council approve the attached resolution establishing a local residential all-way stop sign warrant.

Background/Discussion:

At its September 20, 1994, Work Session the City Council reviewed a staff proposal for a local residential stop sign warrant (see Exhibit B). Comments from Council included a suggestion to incorporate Fremont's Pedestrian and Critical Speed warrants that specifically consider the presence of school children in the criteria. Also, several comments reflected the critical relevance of enforcement to the effectiveness of traffic control devices.

Accordingly, staff reviewed possible criteria to specifically reflect the presence of school children. Fremont's pedestrian and speed warrants are derived from statewide criteria for the establishment of crossing guard protection, except that the threshold for elementary school children is downsized from 40 to 20 and the threshold for speed is modified from 40 mph to 10 mph above the posted limit. These changes are consistent in reflecting local residential street conditions as opposed to state highways in the Caltrans warrant. Staff concurs that it is appropriate to incorporate these warrants for all-way stop signs where crossing guards may not be established. Thus, the proposed warrant has been revised to incorporate these criteria (see Exhibit A).

Also, staff revised the proposed traffic volume definition for local streets so that the new warrant would be applicable to more locations. The new local warrant was evaluated at intersections where neighborhood plans recently recommended the installation of all-way stop signs. At one location where the local warrant was met - Main and Hazel - the traffic volume on Main Street exceeded the 3,000 vehicle per day definition for a "local" street. To more correctly represent typical local streets, the revised warrant modifies that definition to 4,000 vehicles per day. This is consistent with how other cities such as Palo Alto define "local" streets for their traffic safety programs.

In response to concerns about enforcement, staff discussed the issue with the Police Department. They assign both Patrol and Traffic Bureau officers to enforcement duties throughout residential areas based on accident statistical data and neighborhood complaints.

Stop sign and all other traffic related Vehicle Code enforcement is performed by the Patrol Division. Officers on patrol become aware of locations within the City which require specific enforcement. Hazardous or problem locations are determined through observation, community input, and statistical information. Citations are routinely written for violations which occur in the residential neighborhoods as well as other areas of the City.

Traffic Bureau officers are part of the Patrol Division. Currently the Traffic Bureau is authorized for eleven police officer positions. Due to personnel shortages, only ten of those positions are presently filled. Traffic Officers are responsible for the investigation of fatal/major injury collisions and hit and run collisions where suspect information is available.

With our transition to community policing in 1991, demands for services and community expectations have increased resulting in a greater workload for Traffic and Patrol officers. As part of that transition, the focus for the Traffic Bureau has been on specific neighborhood traffic problems and areas statistically determined to be high accident locations. With those demands, there is very limited time that can be devoted to areas that have little or no history of traffic related problems.

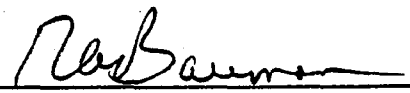
As a general guideline, the following figures represent typical time commitments for Traffic Bureau enforcement officers.

- 20% Targeted enforcement areas, requests for enforcement.
- 10% General traffic enforcement, including high accident locations.
- 30% Accident investigation and report writing.
- 25% Assist patrol officers with non-traffic related activities.
- 5% Community presentations or activities.
- 5% In-service training.
- 5% Administrative functions, radar trailer deployment, project development, other.

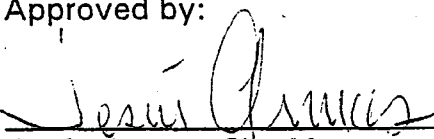
Prepared by:


Daniel Collins, Transportation/Development Manager

Recommended by:


Robert A. Bauman, Acting Director of Public Works

Approved by:


Jesús Armas, City Manager

Attachments: Exhibit A - Revised Local Residential All-Way Stop Sign Warrant
Exhibit B - City Council Work Session Agenda Report, 9/20/94

City of Hayward
Department of Public Works
Engineering and Transportation Division

LOCAL ALL-WAY STOP SIGN WARRANTS FOR RESIDENTIAL STREETS

Intersection: _____

Date: _____

Any of the following conditions may warrant an all-way stop sign installation in a residence district (as defined by Sec. 515 of the California Vehicle Code) on two-lane "local" streets carrying less than 4,000 vehicles/day:

1. **Satisfy Caltrans Warrants:** Satisfied _____ Not Satisfied _____ **OR**

2. **Accident History Warrant:**

Three or more reported collisions of the type correctable by an all-way stop control have occurred within a recent twelve month period, or:

Twelve month period studied _____

Total number of reported collisions _____

Number of collisions susceptible to correction _____

OR

3. **Minimum Volume Warrant:**

Under normal conditions, the minimum volume entering the intersection from all directions averages 300 vehicles per hour for any eight hours of a normal day *and*, the volume entering the intersection from the minor street averages at least 100 vehicles per hour and averages 33% of the total volume entering the intersection for the same eight hours.

Avg/Hr

Total

8-Hour approach volume on major street _____

8-Hour approach volume on minor street _____

8-Hour intersection approach volume _____

Percentage of minor street volume to total approach volume _____

OR

4. **Pedestrian Warrant:**

When 20 or more elementary school children cross the intersection travelling to, or coming from school at a time when the total approach volume exceeds 300 vehicles per hour.

Time: _____

Number of School Children: _____

Approach Volume: _____

OR

5. **Speed Warrant:**

When 20 or more elementary school children cross the intersection and the 85th percentile speed on either street is at least 10 MPH greater than the posted speed limit.

Time: _____

Number of School Children: _____

Posted/85% Speed: _____

OR

4. **Other justifiable factors:**

Conclusion: _____

CITY OF HAYWARD
Department of Public Works
Engineering and Transportation Division

MULTI-WAY STOP WARRANTS

Intersection: _____

Date: _____

Any of the following conditions may warrant an all-way stop sign installation:

1. Where traffic signals are warranted, and urgently needed, the multi-way stop may be an interim measure that can be installed quickly to control traffic while arrangements are being made for the signal installations.

_____ Warranted

_____ Not Warranted

2. An accident problem, as indicated by five or more reported accidents within a 12-month period of a type susceptible to correction by a multi-way stop installation. Such accidents include right and left-turn collisions as well as right-angle collisions.

_____ Total reported accidents in a 12-month period.

_____ Accidents susceptible to correction in the same 12-month period.

3. Minimum traffic volumes:

- a. The total vehicular volume entering the intersection from all approaches must average at least 500 vehicles per hour for any eight hours of an average day, and....

	<u>8 Hour Vol.</u>	<u>Avg. Hourly Vol.</u>
Major Street: _____	_____	_____
Minor Street: _____	_____	_____

- b. The combined vehicular and pedestrian volume from the minor street or highway must average at least 200 units per hour for the same eight hours, with an average delay to minor street vehicular traffic of at least 30 seconds per vehicle during the maximum hours, but....

	<u>Veh + Peds.</u>	<u>Avg Hourly Vol.</u>
Minor Street: _____	_____	_____
Average Delay on Minor Street: _____		

- c. When the 85 percentile approach speed of the major street traffic exceeds 40 miles per hour, the minimum vehicular volume warrant is 70 percent of the above requirements.

Major Street 85% Speed: _____

Percent of Volume Warrant Met: _____

The multi-way stop installation may be useful at some locations. It should ordinarily be used only where the volume of traffic on the intersecting roads is approximately equal. A traffic control signal is more satisfactory for an intersection with a heavy volume of traffic.

REF: STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION TRAFFIC MANUAL



CITY OF HAYWARD AGENDA REPORT

AGENDA DATE 9/20/94

AGENDA ITEM _____
WORKSESSION ITEM WS 4

TO: Mayor and City Council

FROM: Acting Director of Public Works

SUBJECT: Establishment of a Local Residential Stop Sign Warrant

Recommendation:

It is recommended that City Council review and comment on this report which evaluates the establishment of a local residential all-way stop sign warrant.

Background/Discussion:

Over the years, City staff has received numerous requests for installation of all-way stop signs at residential intersections. To determine the appropriateness of installing stop signs at any intersection, the City has used the "warrants" (or minimum criteria) set forth in the State of California Department of Transportation (Caltrans) Traffic Manual (Exhibit A). These warrants are taken directly from the Manual on Uniform Traffic Control Devices, published by the United States Department of Transportation, Federal Highway Administration. While the majority of the agencies in California adhere to these guidelines, some have opted to establish their own warrants. These local warrants are typically derived from the Caltrans warrants, but tend to have somewhat lower minimum criteria.

At the request of the City Manager, staff has evaluated the possibility of establishing local residential all-way stop sign warrants. This request was initiated last September after a petition request for the installation of an all-way stop at the intersection of Nevada Road and Sequoia Road was reviewed by staff and presented to the City Council at the September 7, 1993 meeting. Staff found that the intersection did not meet the Caltrans warrants and recommended against such an installation. However, the issue became more controversial after a petition was presented to oppose the installation of an all-way stop at the intersection. This occasionally occurs where all-way stop sign requests from residential areas have equally determined proponents and opponents. At that time, it was decided by the City Council that the issue would be best resolved if referred to the Longwood-Winton Grove Neighborhood Task Force which was in the formation process. At the time of this report, the neighborhood plan had not been acted upon by City Council. The Task Force recommended that the City consider installation of the sign as part of several measures to ensure safety of pedestrians, control of vehicular traffic, protection of adjoining properties, and discouragement of through traffic. Staff recommended that the signs be re-evaluated after the issue of a local residential all-way stop sign policy is established.

Staff is also analyzing the effects of stop signs that do not meet state warrants in the North Hayward neighborhood. Part of the North Hayward Neighborhood Task Force recommendations approved by the City Council were installation of all-way stops on Montgomery Street at Grace Street, and on Main Street at Hazel Avenue. Staff has conducted radar studies of existing conditions and authorized the installation of these signs. Staff will then conduct a study of the effect these signs have upon speeding. A follow-up report will be submitted to City Council upon completion of the study.

Staff has conducted research into the feasibility of creating a revised set of local warrants for use with residential all-way stop sign requests and has polled the other agencies in Alameda County. Of the other twelve city and county agencies in Alameda County, two (Fremont and San Leandro) have developed formal local warrants, and one (Livermore) has developed an informal policy. The warrants established by these agencies vary and reflect the subjective nature of establishing local residential stop sign warrants (Exhibit B).

While both the City and the public share a common concern for safety at intersections, the purpose, value, and impact of stops signs are often misunderstood by the public. Beyond just safety at intersections, City staff must also attempt to maintain a safe and effective traffic system consistent with the surrounding development.

Extensive research has been performed on the effect of stops signs both nationally and internationally. The generally accepted sole purpose of stop signs is to assign right-of-way at intersections, i.e., regulate flow at the intersection of two streets which have similar and substantial volumes. While properly warranted stop signs provide many benefits, unwarranted stop signs do not. In this text, "unwarranted" refers to those stop signs that fail to meet Federal and State criteria.

In establishing a policy, it is important to know the impacts and intent of stop signs.

Effects on Speed Control

It is a common misconception that stop signs serve to control speed. The Federal Manual on Uniform Traffic Control Devices specifically states that stop signs should *not* be installed for speed control. At intersections where unwarranted stop signs have been installed, speeds at the intersection tend to be reduced, however, speeds within a block of the stop signs remain unaffected, or may actually increase as drivers try to make up for "lost time". Furthermore, compliance with the stop signs, which is essential for their effectiveness, may be 25% or less as drivers only slow down to whatever speed is required to evaluate the safety of entering the intersection before deciding upon their course of action. This can be attributed to driver frustration in having to stop when there is no conflicting traffic and when the visibility upon approaching the intersection is good. When drivers do not believe that a restrictive sign appropriately reflects the conditions, the driver often disregards that sign and may develop a learned disrespect for the traffic control device. In summary, stop signs are not effective for speed control.

Effects on Traffic Volumes

Studies have also shown that unwarranted stop signs on residential streets merely shift the volumes to other streets. Often times, this traffic is shifted from a residential collector to a purely local street which is less suited to carry the displaced traffic. While it is true that drivers will tend to follow the "path of least resistance", i.e., one which has less traffic controls, this may not be advantageous, because not only are volumes shifted from collector streets to local streets, but the problems associated with those volumes are also shifted.

Effects on Accidents

A joint but limited study conducted by the cities of San Jose and Cupertino concluded that unwarranted stop signs on local, residential streets do not reduce accidents, but rather increase the potential for accidents. Other studies have shown that litigation can be limited when it can be shown that there are clear and consistent policies, based on nationally recognized guidelines (i.e., the Federal Manual on Uniform Traffic Control Devices) which are locally adopted and applied.

Effects on Pedestrian Safety

A common belief is that stop signs increase the safety of pedestrians. At unwarranted locations where adequate gaps in traffic exist, this may not be true. Under these conditions, a vehicle is present at the intersection for a much longer period while it slows, stops and accelerates. This actually increases the exposure time of the pedestrian to vehicles and reduces or eliminates the natural gaps in traffic at the intersection by increasing the time each vehicle is present. Furthermore, pedestrians are exposed for a much longer period of time to drivers who willfully violate the stop control. Low compliance with unwarranted stops leaves pedestrians vulnerable to these violations.

Council Options

To address the concern for all-way stop signs in residential areas, staff would like to present the following two options for Council to consider:

1) Approve the use of the attached local all-way stop sign warrant in residential areas.

Stop sign requests will be initially evaluated for Caltrans warrants. If these are not met in residential areas, then the procedures addressed in a locally established warrant would be followed. If a local warrant for stop signs in residential areas is established by the City Council, it is recommended that it be in the form shown as Exhibit C, which takes the most reasonable aspects of the warrants established by Fremont, San Leandro, and Livermore. With the request, staff will also evaluate other justifiable factors such as sight distance, roadway curvature or elevation, and geometry and physical features of the intersection.

If stop signs are found to meet local warrants, staff will solicit feedback from those within 300 feet of the proposed location prior to installation to ascertain if the issue is controversial. To demonstrate how the proposed local warrants might be applied, data from the Nevada Road/Sequoia Road study were used and the results are shown in Exhibit D.

Some positive points to support establishing the attached local residential all-way stop sign warrant are:

- Conforms with 25% of the agencies in Alameda County by providing for a more lenient warrant in an area where traffic volumes tend to be lower.
- Involves those residents most affected by an all-way stop.
- Provides more positive response to citizen requests.

Some negatives about establishing a local residential all-way stop sign warrant are:

- Straying from the uniformity of State and Federal warrants may reduce the number of defenses available to the City in the event of litigation.
- Inconsistent with generally accepted professional traffic engineering practices and opinions.

2) Continue to use the Caltrans warrants.

This option is consistent with most of the professional studies conducted regarding establishment of local residential stop sign warrants. Staff would continue to use the Caltrans warrants as guidelines and will also consider sight distance, roadway curvature or elevation, and geometry and physical features of an intersection. Of course, the City Council would maintain the authority to install stop signs at their discretion.

Some positive points about using the Caltrans warrants are:

- Applying nationally established guidelines may limit litigation.
- Gives the public a solid, easily understood policy which is nationally accepted.

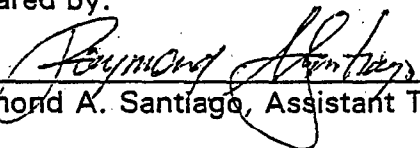
Some negative points about using the Caltrans warrants are:

- Is not very responsive to citizen requests.
- Is not tailored to unique characteristics of area (i.e., residential) and street function (i.e., local)

Conclusion:

Based on the City Council's comments, staff will return in regular session for formal action on establishment of local residential stop sign warrants.

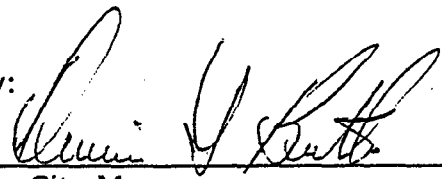
Prepared by:


Raymond A. Santiago, Assistant Transportation Engineer

Recommended by:


Robert A. Bauman, Acting Director of Public Works

Approved by:


FOR Jesús Armas, City Manager

Attachments:

- Exhibit A: Caltrans Stop Sign Warrant
- Exhibit B: Comparison of Local Stop Sign Warrants
- Exhibit C: Local Residential Stop Sign Warrants for Consideration
- Exhibit D: Example of Proposed Stop Sign Warrants
- Exhibit E: References

**COMPARISON OF LOCAL RESIDENTIAL STOP SIGN WARRANTS
(Alameda County Agencies)**

Criteria	Caltrans	San Leandro	Fremont	Livermore
Used as an interim measure until traffic signal installation	Yes	N/A	N/A	N/A
Accident History	5 or more reported within 12 month period susceptible to correction	5 or more reported within 12 month period susceptible to correction	3 or more accidents susceptible to correction within a 12 month period.	3 or more accidents susceptible to correction within a 12 month period.
Vehicular Volumes	500 vehicles per hour during any 8 hours of a day	300 vehicles per hour during any eight hours a day from all approaches on an average day, and vehicles from minor street must average 1/3 of total volume entering intersection (100 per hour minimum)	2000 for major street, 900 for minor street per day. When minor street 8 hour approach volume is greater than 30% of the intersection approach volume for the same period and the total 8 hour approach volume averages 250 vehicles per hour.	300 vehicles per hour entering the intersection during any 8 hours of any day and the minor street carries at least 100 vehicles per hour during the same 8 hours, and the 8 hour volume for the minor street is at least 1/3 of the intersection volume for the same period.
Pedestrians	Combined vehicle and pedestrian volumes from the minor street average 200 per hour for the same 8 hours	300 vehicles entering intersection and 100 pedestrians crossing main street during same 8 hours.	20 or more elementary school children utilize the intersection at a time when 300 vehicles are in direct conflict with pedestrians.	N/A
Delay	Average delay to minor street of 30 seconds per vehicle during peak hours	N/A	N/A	N/A
Critical (85th) Percentile Speed	Exceeds 40 MPH when 70 percent of volume warrant is fulfilled.	N/A	At least 10 MPH greater than the posted speed when 20 or more elementary school children utilize the intersection.	N/A
Other		Straight line sight distance on one or more approaches of the major street is 150 feet. In Residential areas, volume warrants reduced to 60% if certain conditions are met.	Warrants apply to residential collectors or minor residential streets.	N/A

Exhibit B - 1

City of Hayward
Department of Public Works
Engineering and Transportation Division

LOCAL ALL-WAY STOP SIGN WARRANTS FOR RESIDENTIAL STREETS

Intersection: _____

Date: _____

The following conditions may warrant an all-way stop sign installation in a residence district (as defined by Sec. 515 of the California Vehicle Code) on two-lane "local" streets carrying less than 3,000 vehicles per day:

1. **Satisfy Caltrans Warrants:** Satisfied _____ Not Satisfied _____ **or**

2. **Accident History:**

Three or more reported accidents of the type correctable by an all-way stop control have occurred within a recent twelve month period:

Twelve month period studied _____

Total number of reported accidents _____

Number of accidents susceptible to correction _____

or

3. **Minimum Volume Warrant:**

Under normal conditions, the minimum volume entering the intersection from all directions averages 300 vehicles per hour for any eight hours of a normal day **and**, the volume entering the intersection from the minor street averages at least 100 vehicles per hour and averages 33% of the total volume entering the intersection for the same eight hours.

Avg/Hr

Total

8-Hour approach volume on major street _____

8-Hour approach volume on minor street _____

8-Hour intersection approach volume _____

Percentage of minor street volume to total approach volume _____

or

4. **Other justifiable factors:**

Conclusion: _____

City of Hayward
Department of Public Works
Engineering and Transportation Division

LOCAL ALL-WAY STOP SIGN WARRANTS FOR RESIDENTIAL STREETS

Intersection: NEVADA ROAD AND SEQUOIA ROAD

Date: 9/14/94

The following conditions may warrant an all-way stop sign installation in a residence district (as defined by Sec. 515 of the California Vehicle Code) on two-lane "local" streets carrying less than 3,000 vehicles per day:

1. **Satisfy Caltrans Warrants:** Satisfied _____ Not Satisfied ✓ **or**

2. **Accident History:**

Three or more reported accidents of the type correctable by an all-way stop control have occurred within a recent twelve month period:

Twelve month period studied

7/92 - 6/93

Total number of reported accidents

-0-

Number of accidents susceptible to correction

-0-

or

3. **Minimum Volume Warrant:**

Under normal conditions, the minimum volume entering the intersection from all directions averages 300 vehicles per hour for any eight hours of a normal day and, the volume entering the intersection from the minor street averages at least 100 vehicles per hour and averages 33% of the total volume entering the intersection for the same eight hours.

	<u>Avg/Hr</u>	<u>Total</u>
8-Hour approach volume on major street	<u>163</u>	<u>1302</u>
8-Hour approach volume on minor street	<u>39</u>	<u>314</u>
8-Hour intersection approach volume	<u>202</u>	<u>1616</u>
Percentage of minor street volume to total approach volume		<u>24%</u> or

4. **Other justifiable factors:**

Sight distance is good, roadway is flat and straight, valley gutters ("dips") exist for both approaches on Nevada.

Conclusion: Not warranted by any of the above criteria.

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